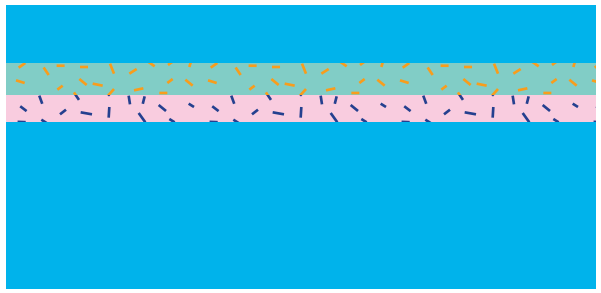
Diffusion of Atoms in Semiconductors Elucidated

Large Disparity Between Ga and Sb Self-Diffusion in GaSb Seen

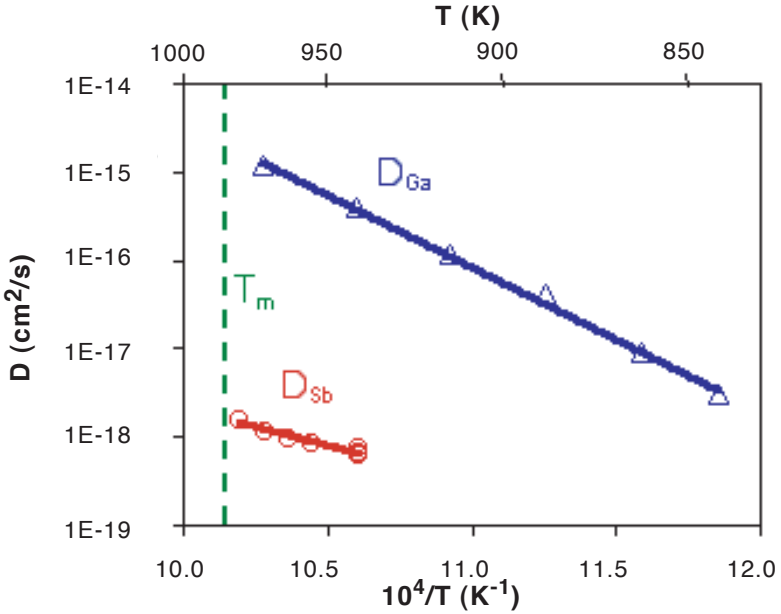
GaSb Isotopic Superlattice



200 nm natural GaSb cap
100 nm $^{69}Ga^{121}Sb$
100 nm $^{71}Ga^{123}Sb$

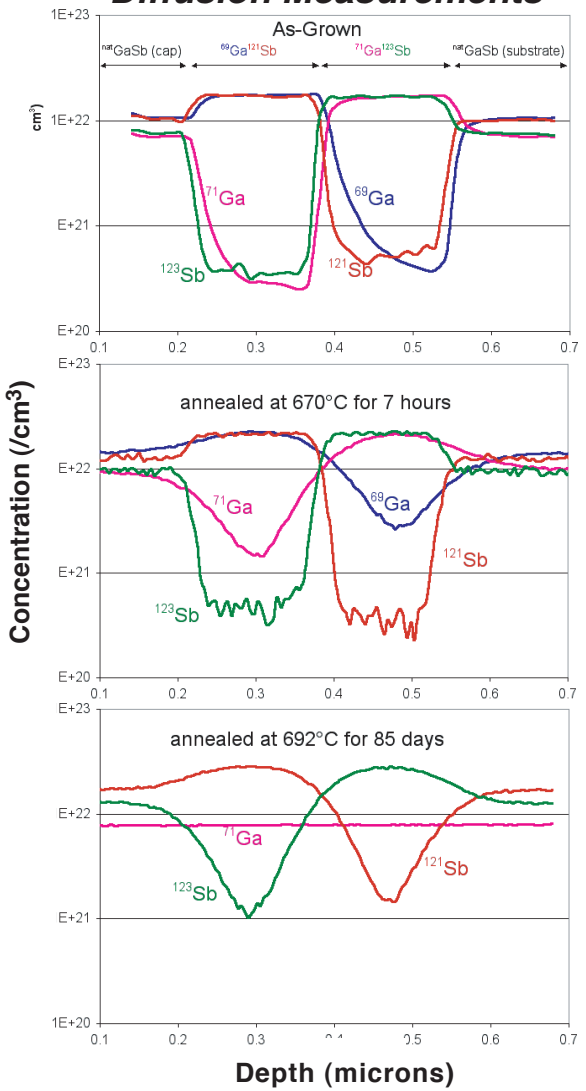
natural GaSb substrate

Diffusion Coefficients



Sb self-diffusion coefficient (red) is 1000x slower than Ga coeficient (blue), even up to nearly the melting point of GaSb (green).

Diffusion Measurements



SIMS profiles—Top: as-grown isotope superlattice. Middle: After 7 hours at 670 ˚C, Ga diffusion is evident (pink and blue); Sb structure is intact (green and orange). Bottom: After 85 days at 692 ˚C, Ga isotopes have completely diffused; Sb structure still visible.

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